



## Designing reliable silicone elastomers for high temperature applications

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# 11<sup>th</sup> Annual PolyMac Conference

## Abstract (Poster Presentation)

### “Designing reliable silicone elastomers for high temperature applications”

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Silicone elastomers find application in fields ranging, for instance, from soft robotics and electronic skin, to the automotive and the aerospace industries. In addition, the high dissociation energy and the low energy barrier to rotation of the siloxane bond make silicone elastomers suitable for high temperature applications.<sup>[1,2]</sup> Reliability and durability are strict requirements for silicone elastomers employed in high temperature applications, and significant effort has been invested by the industrial and the scientific communities into improving their thermal stability. Exploiting traditional methods, such as adding heat-resistant fillers or chemical modifications, still suffer from remarkable shortcomings. Therefore, developing cheap and easy solutions to improve thermal stability of silicone elastomer is a major challenge. This study focuses on determining the role of network structure on the thermal degradation of silicone elastomers.<sup>[3]</sup> Elastomers with different stoichiometric ratios were synthesized to vary the relative fractions of elastic, dangling, and sol structures. Thermogravimetric analysis was used to investigate the thermal degradation behaviour of the silicone elastomers synthesized with different cross-linking densities and to analyse their thermal degradation products. Here, we demonstrate how to optimize the stoichiometric ratio used to prepare silicone elastomers in order to enhance their thermal stability by simple means.

[1] N. S. Tomer, *Open J. Org. Polym. Mater.* 02 (2012) 13-22.

[2] J. S. Kim, S. Yang, B. S. Bae, *Chem. Mater.* 22 (2010) 3549-3555.

[3] E. Ogliani, L. Yu, P. Mazurek, A. L. Skov, *Polym. Degrad. Stab.* 157 (2018) 175-180.